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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/068,755	05/16/2002	Stanton James Dent	DC4968	9286

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DOW CORNING CORPORATION CO1232
2200 W. SALZBURG ROAD
P.O. BOX 994
MIDLAND, MI 48686-0994

EXAMINER

IM, JUNGHWA M

ART UNIT	PAPER NUMBER
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2811

DATE MAILED: 12/18/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/068,755

Applicant(s)

DENT ET AL.

Examiner

Junghwa M. Im

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 20 August 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-19 and 23-32 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-19 and 23-32 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. §§ 119 and 120

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 13) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.
- a) ☐ The translation of the foreign language provisional application has been received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

Election/Restrictions

Applicant's remark on the restriction requirement in Paper No.10 is acknowledged. Upon reconsideration, however, the examiner is of the opinion that the requirement is improper. The restriction requirement is, therefore, withdrawn. Product and process claims will be examined.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Amako et al. (EP 1041117), hereafter Amako in view of Shiobara et al. (US 6083774), hereafter Shiobara.

Regarding claim 1, Figure 1 of Amako shows a semiconductor wafer with an active surface comprising an integrate circuit (an inherent element to operate functionally), bonding pads (which are needed for an electrical connection); and a cured silicone covering a portion of the active surface, and the silicone member comprising an organopolysiloxane containing an average of at least two silicon-bonded alkenyl groups per molecule (paragraph 0016), an organohydrogensiloxane containing an average of at least two silicon-bonded hydrogen atoms per molecule (paragraph 0035), an inorganic filler (paragraph 0038), a hydrosilylation catalyst

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(paragraph 0030), and heating the silicone deposit to form the cured silicone member (paragraph 0039).

Since Amako discloses a cured silicone member having the same composition to the Applicant's disclosure, it is inherent or alternatively obvious that the cured silicone of Amako has a coefficient of linear expansion and a modulus in a vicinity of the range recited in the pending claim.

Amako discloses the substantially the entire claimed structure except "a inorganic filler having a area surface less that $25 \text{ m}^2/\text{g}$." Shiobara discloses an organic filler used in the curable resin having a surface area less than $25 \text{ m}^2/\text{g}$ for a semiconductor packaging (col.7, lines 4-9). It would have been obvious to one of ordinary skill in the art at the time of the invention to incorporate the teaching of Shiobara to a semiconductor device of Amako to provide a proper particle size distribution for the cured silicone improving the contact between the interfaces. In addition, Shiobara further discloses that a particular size (which can be expressed in terms of the surface area) of the filler can be determined based on the configuration of the packaging device (col.1, lines 1-29).

Regarding claim 2, it is obvious that the wafer further comprises streets for separation of devices on a wafer.

Regarding claim 3, Amako does not teach a thickness of the cured silicon. However, it would have been obvious to one of ordinary skill in the art at the time of the invention to have a thickness of the cured silicone form 10 to 200 μm to provide an effective engagement between a subassembly and a device.

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In addition, it would have been obvious to one of ordinary skill in the art at the time of the invention to have a thickness of the cured silicone in a range recited in the pending claim since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only in routine skill in the art. *In re Aller*, 105 USPQ 233.

Regarding claim 4, Amako discloses a composition of the organohydrogensiloxane to offset an alkenyl group (paragraph 0035).

Regarding claims 5-6, Shiobara discloses an inorganic silica filler with the surface area within the range of the recited limitation (col.7, lines 1-10).

Regarding claims 7-9, Amako discloses a concentration of a hydrosilylation catalyst inhibitor with platinum within the recited range (paragraphs 0030, 0031).

Regarding claims 10, Amako discloses the semiconductor package further comprising an organopolysiloxane resin consisting essentially of $R^3SiO_{1/2}$ siloxane units and $SiO_{4/2}$ siloxane units wherein R^3 is independently selected from monovalent hydrocarbon and monovalent halogenated hydrocarbon groups (paragraphs 0017, 0037).

Regarding claims 11-12, Figure 1 of Amako discloses a packaging device further comprising a cured organopolysiloxane dome layer.

Claim 13 is rejected under 35 U.S.C. 103(a) as being unpatentable over Amako and Shiobara as applied to claim 1 above, and further in view of Fjelstad (US 6284563).

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Regarding claim 13, the combined teachings of Amako and Shiobara shows a silicon wafer with a structure substantially identical to the instant invention except a connection of a metal trace.

Fjelstad shows a semiconductor package comprising a semiconductor wafer 100 having an active surface 115 comprising at least one integrated circuit 170, 175 wherein each integrated circuit has a plurality of bond pads 110, a cured silicone layer 140 with a thickness range of 74-200 um covering a portion of the active surface of the wafer except the bond pads, and a metal trace 170, 175 having a proximal end attached to each bond pad 110 and a distal end lying on the surface of the cured silicone layer 140.

It would have been obvious to one of ordinary skill in the art at the time of the invention to incorporate the teaching of Fjelstad to a semiconductor device of Amako and Shiobara to have a connection of the metal trace to a bond pad and a cured silicone layer since such a configuration alleviates stresses created between the substrate and the chip.

Claims 14-19 and 23-32 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fjelstad in view of Amako and Shiobara.

Regarding claim 14, Figures 1A-1F (col.8, lines 13-64) of Fjelstad show a the method comprising the steps of printing a silicone composition on at least a portion of an active surface (115) of a semiconductor (100) to form at least one silicone deposit (140), wherein the active surface comprises at least one integrated circuit (170, 175), each integrated circuit has a plurality of bond pads (110), at least a portion of each bond pad is not covered by the silicone deposit (as shown in Figure 1C), and heating the silicone deposit (140; cured silicon layer).

Fjelstad fails to teach a specific silicone composition recited in the pending claim. Figure 1 of Amako shows a semiconductor device, which has a silicone composition on a portion of the active surface of a silicon chip and the silicone composition comprising an organopolysiloxane containing an average of at least two silicon-bonded alkenyl groups per molecule (paragraph 0016), an organohydrogensiloxane containing an average of at least two silicon-bonded hydrogen atoms per molecule (paragraph 0035), an inorganic filler (paragraph 0038), a hydrosilylation catalyst (paragraph 0030), and heating the silicone deposit to form the cured silicone member (paragraph 0039).

Since Akamo discloses a cured silicone member having the same composition to the Applicant's disclosure, it is inherent or alternatively obvious that the cured silicone of Akamo has a coefficient of linear expansion and a modulus in a vicinity of the range recited in the pending claim.

Amako discloses the substantially the entire claimed structure of the silicone composition except "a inorganic filler having a area surface less that $25 \text{ m}^2/\text{g}$." Shiobara discloses an organic filler used in the curable resin having a surface area less than $25 \text{ m}^2/\text{g}$ for a semiconductor packaging (col.7, lines 4-9). It would have been obvious to one of ordinary skill in the art at the time of the invention to incorporate the teaching of Shiobara to a semiconductor device of Amako to avoid contact failure between the contact interfaces through lowering molding pressure.

In addition, Shiobara further discloses that a particular size (which can be expressed in terms of the surface area) of the filler can be determined based on the configuration of the packing device (col.1, lines 1-29).

Therefore, It would have been obvious to one of ordinary skill in the art at the time of the invention to utilize the teachings of Amako and Shiobara for the compliant layer of Fjelstad in order to have the cured silicone layer with a specific composition as recited in the pending claim to improve the adhesion through better curability as taught by Amako (paragraph 0001-paragraph 0002).

Regarding claims 15-19, 23-25 and 30-32 have been discussed above in claims 2-6, 10-12 and 7-9 in concordance.

Regarding claims 26 and 27, Fjelstad discloses that the printing step is carried out using stencil printing or screen printing (col.9, lines 54-56).

Regarding claim 28, Amako discloses that the silicone deposit is carried put at 150° for 30 minutes (paragraph 0054).

Regarding claim 29, Fjelstad shows further comprising the step of forming a metal trace 170, 175 on the wafer 110, a cured silicone layer 140 with a thickness range of 74-200 um covering a portion of the active surface of the wafer except the bond pads, and the metal trace 170, 175 having a proximal end attached to each bond pad 110 and a distal end lying on the surface of the cured silicone layer 140.

Response to Arguments

Applicant's arguments with respect to pending claims have been considered but are moot in view of the new ground(s) of rejection.

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Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Junghwa M. Im whose telephone number is (703) 305-3998. The examiner can normally be reached on MON.-FRI. 8:30AM-5:00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Eddie C Lee can be reached on (703) 308-1690. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9318.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

jmi
December 19, 2003



EDDIE LEE
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2800